

BEFORE THE
POSTAL REGULATORY COMMISSION
WASHINGTON, D.C. 20268-0001

INQUIRY CONCERNING)
CITY CARRIER COSTS) Docket No. PI2017-1

**COMMENTS OF
AMAZON FULFILLMENT SERVICES, INC.**

(September 15, 2017)

Amazon Fulfillment Services, Inc. (“AFSI”) respectfully submits these comments in response to Order No. 3926. These comments concern a threshold methodological issue that is implicit in Order No. 3926: the validity of any single equation city carrier letter route cost model, which simultaneously estimates through a single regression the variability of letter route costs with respect to all explanatory variables.

The ongoing investigation of potential city carrier letter route data sources is likely to be useful in identifying opportunities to (1) improve city carrier street cost attribution methods and (2) keep those methods up-to-date. Whether the data should be used in a single equation model, however, is a separate question. Even if the Postal Service develops an improved data set, a single equation model is unlikely to produce accurate results. The inherent limitations of single equation models, which were discussed by Dr. Bradley in Docket No. RM2015-7, were one of the main reasons for

the adoption of the established methodology, which separately estimates variabilities for parcels and accountables:

It is important to recognize that the Postal Service's approach to estimating parcel variabilities is based, in large part, on the practicality of accurately estimating those variabilities. ... Philosophically, I agree with Dr. Neels that there are certain advantages associated with estimating an overall "top-down" variability equation in which all variabilities and marginal costs are simultaneously estimated. In theory, such an approach could allow for econometrically testing separability. In practice, as Dr. Neel's *[sic]* own research has demonstrated, this can be a very difficult course. Even with 10,000 observations, Dr. Neels could not successfully overcome the problems of missing data and multicollinearity, which often plague top-down approaches....

Dr. Neels indicated that his main concern is increasing the attribution of costs to parcels, but the Postal Service, and the Commission, must be concerned with the accurate attribution of costs to all products. In practice, it could well be that attempts to estimate the interaction between parcels and the rest of the mail stream could materially reduce the accuracy of the estimates of not only parcel variabilities but the variabilities for other bundles such as DPS, cased, or collection mail. If nothing else, adding parcels to a variability equation could induce sufficient multicollinearity to render inaccurate the separate estimation of all variabilities. In this circumstance, the prudent approach is to estimate the variabilities of parcels and accountables separately from *[sic]* the estimation of variabilities for the other mail streams.

Docket No. RM2015-7, Dr. Bradley's Analysis of the Supplemental Report of Dr. Kevin Neels On Behalf of United Parcel Service (filed July 8, 2015) at 23-24 (footnote deleted).

A particular concern is the likelihood that including additional highly correlated explanatory variables in a single regression will worsen the severity of multicollinearity:

The purpose of the econometric models presented in this proceeding is to estimate the variability of city carrier street costs with respect to mail

volume by type (e.g., delivery point sequenced letters, cased mail, sequenced mail, in-receptacle parcels, deviation parcels). This modeling is an intermediate step in the method for attributing city carrier street costs to individual products.

Given this purpose, an acceptable model must be able to identify the independent effect of each of these types of mail on city carrier street costs. A model that can explain variations in city carrier street costs, but cannot identify the individual effect of each variable, is insufficient.

For this reason, multicollinearity – a high degree of correlation between two or more explanatory variables – can limit the ability to estimate the effect of individual explanatory variables on the dependent variable.

Docket No. RM2015-7, Declaration of Christian T. Lundblad on Behalf of Amazon Fulfillment Services, Inc. at 5-6. As Amazon noted in Docket No. RM2015-7:

Dr. Neels' imputation procedure causes many of the most important explanatory variables to be highly correlated with each other, a flaw known as multicollinearity. The multicollinearity is severe enough to make the model useless.

Docket No. RM2015-7, Comments of Amazon Fulfillment Services, Inc. (July 8, 2015) at 2. Indeed, Dr. Lundblad found that the correlations between the imputed parcel variables and delivery points were “93 percent for deviation parcels [and] 90 percent for in-receptacle parcels.” Docket No. RM2015-7, Declaration of Christian T. Lundblad on Behalf of Amazon Fulfillment Services, Inc. at 10.

The key problems resulting from the heightened multicollinearity in the single regression approach are the lack of precision in the parameter estimates and the instability associated with small variations in the model. As Dr. Bradley observed about Dr. Neels' single regression proposal:

For example, of the nine terms including parcels in Dr. Neels' modified Proposal 13 equation, six of them (66.7 percent) ... are not statistically significant at the 5 percent level and five of them are not statistically

significant (55.5 percent) at the 10 percent level. If one uses just the four coefficients that are statistically significant at the 10 percent level to recompute the variability, it falls to just 1.8 percent. Additionally, I attempted to implement Dr. Neel's [*sic*] modified approach with the national Form 3999 dataset, by using it to estimate a regular delivery equation including parcels. That effort produces a variability of 1.0 percent for parcels when all terms are used in its calculation, and a variability of 3.6 percent when just the terms that were significant at the 10 percent level are used. This is a very wide variation in results.

Dr. Bradley's Analysis of the Supplemental Report of Dr. Kevin Neels On Behalf of United Parcel Service (filed July 8, 2015) at 24. Even with improved data, a single regression approach would still need to be examined with these same tests related to precision and instability, and it would very likely still fail them.

The Postal Service's recent report on its exploration of a top-down model of city carrier costs underscores the issues with multicollinearity that have been highlighted in the past. These new analyses show substantial evidence of multicollinearity. The resulting coefficient estimates are not statistically significant:

First, as Table 5 reveals, the top-down equation exhibits the classic multicollinearity-induced pattern of a high R^2 statistic accompanied by many low individual t-statistics. In other words, the cost drivers, together, do a good job explaining the variation in street hours, but multicollinearity prevents accurately parsing that explanatory power to individual volume types. Nearly a third of the estimated coefficients are not statistically significant.

United States Postal Service, Report on Research Into the Ability of a Top-Down Model To Accurately Estimate City Carrier Street Time Variabilities (filed August 18, 2017) at 18. The imprecision in the coefficient estimates is shown further by the sensitivity of the estimated values to minor changes in either the data or the model specifications. *Id.* at 30. Indeed, some of the resulting marginal time estimates are

negative, a result that is obviously nonsensical. *Id.* at 23, 30, 31. Furthermore, even the most complex and refined versions of the models tested by the Postal Service still lack a measure of collection mail volume, an omission that leaves the models unusable. *Id.* at 38. Developing an appropriate measure of collection mail would require adding still other variables for collection mail to the model. That would further exacerbate the problems with multicollinearity.

Finally, the discovery requests and the motion for extension of time submitted by United Parcel Service, Inc. in this docket¹ suggest that UPS may, as it has done in several other recent dockets on Postal Service costing, propose in its comments that the Commission accept the results of complex new quantitative models or other numerical studies developed by UPS consultants. A Public Inquiry proceeding with a single round of comments, however, is not an appropriate forum for considering new proposals and data not previously noticed by the Commission for comment. If UPS submits new analyses of this kind in its comments, due process precludes the Commission from relying on the analyses without either noticing a new proceeding to consider them or, at a minimum, allowing other interested parties to submit reply comments, with a comment period long enough to provide a fair opportunity to analyze and develop responses to the new analyses. See *Mail Order Ass'n of America v. USPS*, 2 F.3d 408, 428-430 (D.C. Cir. 1993) (“*MOAA*”).

¹ Motion of UPS for Issuance of Information Request to the USPS (June 22, 2017); Motion of UPS to Extend Filing Deadline (Aug. 23, 2017); Second Motion of UPS for Issuance of Information Request to the USPS (Aug. 25, 2017).

The need for careful testing and scrutiny of any empirical analyses that UPS might submit in its comments is underscored by the track record of the cost models proposed by UPS in the past two years. In Docket No. RM2016-2, for example, UPS and Dr. Neels of The Brattle Group proposed to shift more than \$3 billion from institutional costs to attributable costs based on a set of univariate regressions. The regressions had major flaws. First, each regression used only a single explanatory variable and eight data points. Order No. 3506 at 65, 86-87, 91-92. Second, the model was one-sided: it tested only whether a portion of institutional costs should be recategorized as attributable, but ignored whether any attributable costs should be recategorized as institutional. *Id.* at 93 n. 110. The Commission rejected the UPS model on several grounds and referenced “the weakness of Neels’s conceptual approach and unreliability of the obtained econometric results.” *Id.* at 93 n. 110.

Similarly, in Docket No. RM2016-12, UPS and its outside economists (Dr. Neels and Dr. Powers of The Brattle Group) submitted a simulation model in an attempt to criticize the Postal Service’s estimates of the variability of purchased highway transportation capacity with respect to volume. The Commission found the UPS simulation model to be unreliable, noting “the constructed network is oversimplified, abstract, and unrealistic, and the simulated data do not reveal a true interaction between volume and capacity.” Docket No. RM2016-12, Order No. 3973, Appendix at 4.

In light of this track record, any new study offered by UPS in its comments in this docket should be given no weight without an ample opportunity for analysis and rebuttal by other interested parties.

Respectfully submitted,

/s/

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